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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. LI
NO. 1325

SATURDAY, NOVEMBER 18, 1944

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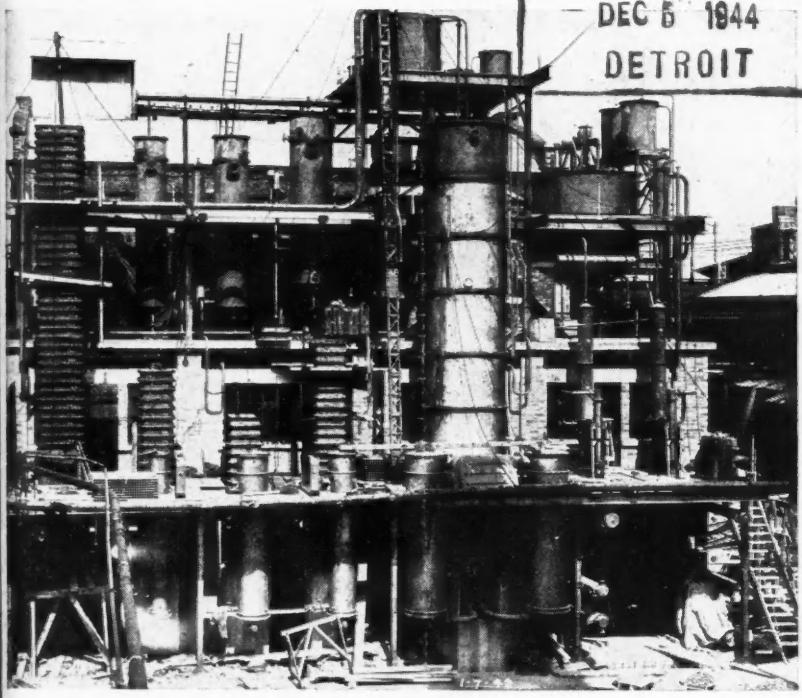

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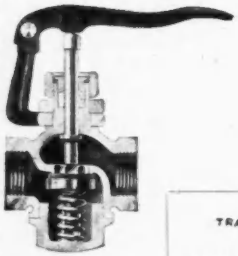

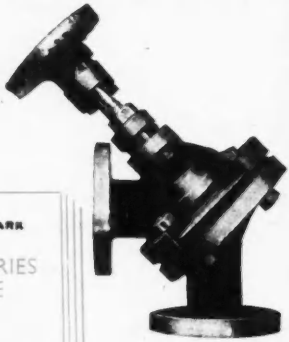

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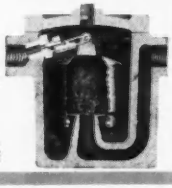

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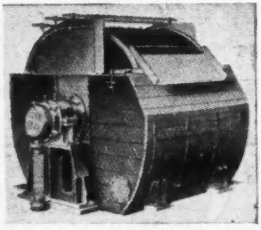

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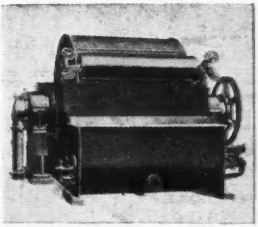

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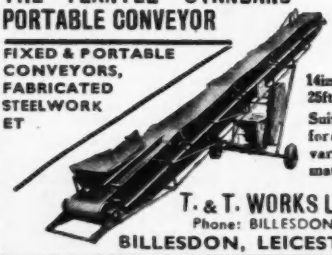

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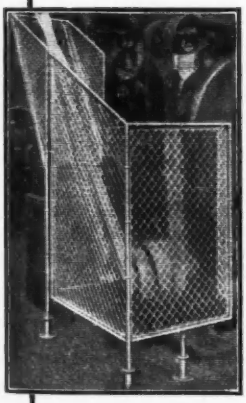

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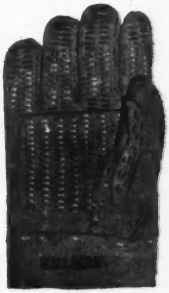

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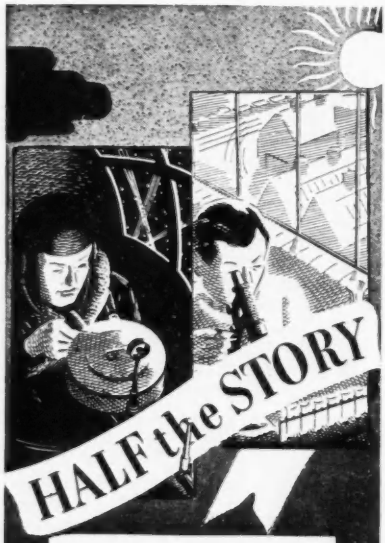

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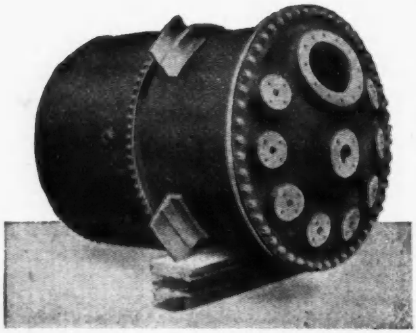

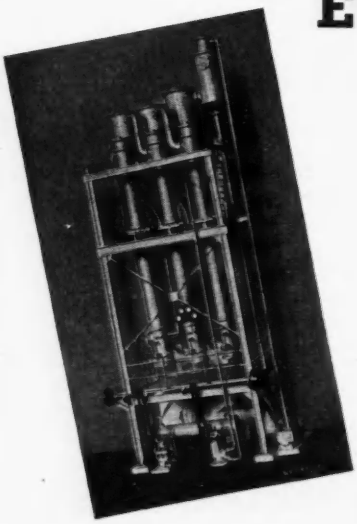

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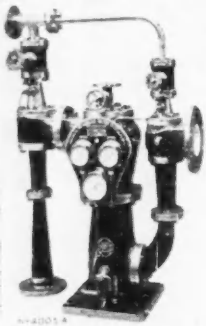

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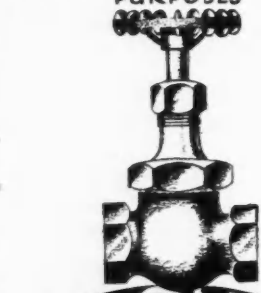

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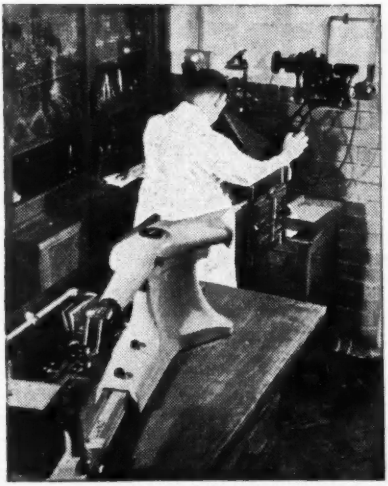

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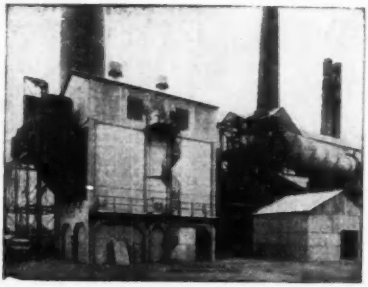

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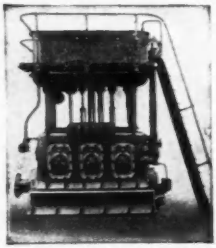

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Executives as Directors

CONSIDERABLE interest has been aroused by a proposal of the steel and engineering concern, Dorman, Long and Co., Ltd., to appoint any of the company's executives as "special directors." The appointment of men with technical qualifications to the board of their company has been frequently advocated in these columns, and Dorman, Long's proposal is at least a step in the right direction.

We have always maintained that there should be much closer contact between members of the staff of companies, in particular of companies whose work is essentially technical, and the directors who have to sanction proposals and to direct the affairs of the company. The work of company directors is essentially different from that of executives. The directors are the generals who should, by their experience, opportunities, or training, know more than the rank and file. They will not necessarily know more about the day-to-day difficulties with which the employees must cope, but they should be able to take wider views, to see ahead over a wider field, and to take decisions on a higher plane of policy. There is, for example, a fundamental difference between the cashier or salaried accountant of a company and a financial magnate in the City. Both may be equally essential and equally good at their particular job, but the magnate is supposed to have contacts and an outlook which but few employee accountants could be expected to possess. Nevertheless, though the accountant may not be fitted to take the place of the financial director, he may be in a position to put certain views on the financial position of the company with a completeness unattainable by anyone else. It is not necessarily the same for him to have explained the position to one of the directors, and to have it put to the rest of the board second-hand, if at all, at that director's individual discretion.

If, however, a case can be argued for the appointment of purely commercial or financial executives to the board, a far stronger case can be made out for the appointment of technical executives to the board. The chemist, the chemical engineer, the engineer, according to the nature of the company's business, may be the key man in maintaining the prosperity of the concern. In such businesses it is quite common in

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this country to find no technical man on the board, or at the best to find only directors with the most rudimentary knowledge of technical and scientific matters. We have told the story before of how one of our best-known chemists (now, alas, dead), who later held one of the highest positions in the country, was refused a seat on the board of his company "because he knew so much that he might dominate the board." This attitude is all too common still. We have it on the highest Government authority that this country requires, above everything else, industrial efficiency. How can true industrial efficiency be promoted if those whose task it is to see that industrial methods are efficient have no power to carry out their policy, and have not even any certainty that their recommendations will be put to the board, and that, if put, they will be adequately explained and discussed? Private enterprise is being called on to justify its functions to-day. We are wholly in favour of private enterprise—when it is truly enterprising. But if private enterprise is to be retained in the post-war world, its affairs must be run efficiently. Many of the inefficiences are due to the inability of those at the head of affairs to grasp technical problems.

This brings us to the question whether, in fact, the action proposed by Dorman, Long is a satisfactory solution of the problem of adequate representation of the technical staff on the board. The proposal is that the existing directors may appoint "any manager or other officer or person in the employment of the company" to be a "special director." These special directors do not retire in rotation, nor have they (apparently) any personal liability such as the other directors have, nor are they necessarily a party to the acts of the board. It has been explained that the purpose of the step is to show appreciation of the senior executives' services, to associate them with the policy of the firm and to increase their prestige; and it is further said that this is in accordance with the present trend in industry, which generally favours an increase in the number and influence of permanent executives on boards and a decrease in that of "outside" or advisory directors. This is very good, but the sting of the proposal is in its tail: "In calculating the number to form a quorum at any meeting of the directors the special directors present shall not be counted. A special director shall not be entitled to receive notice of or attend or vote at a board meeting, except when expressly invited."

Clearly, an arrangement such as this gives the executive directors no power whatever, and could, in practice, leave them exactly where they were before being made special directors. The change which is proposed does not, therefore, imply any wide acceptance of the view that an increase in the direct responsibility of executive management to the shareholders is desirable. It cannot be regarded as a satisfactory model for other concerns. We have no doubt that the board of Dorman, Long really intends to invite the special directors to attend every meeting and to vote, and generally to take their full share in the deliberations of the board. The provisions just quoted are probably only a safeguard against possible eventualities. But another board might interpret them very differently.

We can quite understand that there may be a difficulty in many firms in finding employees who are possessed of those qualities which make a sound director; because a man is head of his department, or a good engineer or chemist, he is not necessarily fitted to control the business in which he is engaged. Many compromise solutions might be suggested, but one which would suit one firm might not suit another. However, in the best interests of industry we feel that at least one technical employee of every firm should be a member of the board, and it should be his special duty to bring to the notice of the board the problems affecting the technical side of the firm and to advise the board, if necessary with the aid of a departmental advisory panel, on technical problems as they arise. The solution of this difficult problem requires much thought. The result to be achieved is the promotion of industrial efficiency throughout the land, and that is primarily a technical problem. We must also promote an enterprising outlook in every concern; and that is not wholly a technical problem. On a board of directors many specialists are needed, among them the man with technical knowledge.

NOTES AND COMMENTS

Controlling the Controls

THEY are no mean psychologists, the members of the Select Committee on National Expenditure. In a country as impatient of dictatorial power as this is, they hit the nail on the head when they observe that a good deal of the unpopularity of war-time "Controls" lies in the fact that the words "control" and "controller" connote some sort of absolutism. In a general way, it would appear that the Chemical Controls, which are the subject of the Select Committee's latest report (reviewed elsewhere in this issue), are able to pass muster, in that the goods required have been delivered through their agency. Some of the means by which this delivery was attained, however, are not above criticism. For one reason or another, the production capacity of certain manufacturers has not been fully employed; the reasons may or may not have been adequate, but attention is drawn in the report to the fact that proper explanations should have been given to the aggrieved manufacturers. One trouble appears to be that the operation of the Chemical Controls has tended to heighten rather than diminish the preponderance of the strongest interests in the industry, and this applies not only to contracts for the supply of material, but also to contracts for research and development. Considerable facilities available for the latter purpose appear to have been neglected. The explanation, in one case at any rate, is that owing to the suspicious attitude of a certain firm, the Ministry of Supply had not been able to acquire sufficient information about its capacity for research and development to proceed to the award of a contract.

The Line of Least Resistance

IN view of the fact that the chairman of the Chemical Control Board is a director of the largest chemical company in the country, and that three of the five chemical controllers are directors of companies engaged in the industry, the suspicious attitude mentioned is understandable, though perhaps not really reasonable, on the part of a competitor. For, although active participation by a member of the Control Board in his former business is forbidden, there is no rule against his continuing to receive remuneration from his firm. No allegation is made against the impartiality of the controllers, but it is conceivable that some members of the competing firms had their own ideas about the fallibility of human nature. In one instance the report notes that there still remains a large volume of complaint from one particular firm which cannot be disposed of by a mere explanation on the part of the Control. These complaints, the Committee recommends, should be referred to a properly qualified tribunal with power to hear the arguments of counsel. For our part, we are far from making the cynical assumption that the controllers have been actuated by horrible motives of graft, and if we have to draw a moral from the report, we should be inclined to suspect the existence of that time-honoured bugbear of the English race—the Line of Least Resistance—by following which we allowed this war to afflict our generation. When we read that one firm possessed excellent research facilities and placed them at the disposal of the Ministry while another showed reluctance—even slight—to place its no doubt equally admirable organisation at the officials' disposal, we can understand, even though we must not condone, the instinctive reaction of an overworked Controller.

A Check on German Industry

WE can always learn something from the French. During the four years they have spent under the German heel, they have not allowed their brains to lie fallow, and adversity has sharpened their already keen wits. In a statement to the *Sunday Times*, outlining France's foreign policy for the future, M. Georges Bidault, French Foreign Minister, has given an indication of the way in which Germany's industry might be controlled, and his suggestions seem to us to be capable of being carried out. He disclaims all desire to force the dismemberment of the Reich, or to acquire German territory, and he does not believe in Mr. Morgenthau's plan for turning Germany into a

purely agricultural country. He does, however, insist that Germany's industries, and especially the laboratories of her universities, must remain under Allied supervision. As he says, Germany has given the French, on their own soil, a very good example of how to control industries efficiently without making the control too obvious to the public. We have recorded from time to time, in the pages of THE CHEMICAL AGE, the gradual assumption of control over the great French industries by the German industrial combines, and there seems indeed no reason why Allied industries should not formulate a similar scheme for dealing with German concerns. If industrial Germany were entirely destroyed, we can easily visualise the possibility of complaints from firms who traded with Germany to the effect that they were thus deprived of a legitimate outlet for their energies. If the Germans can be forced, by Allied control, to employ their scientific and technological skill in a civilised way, it will be to the advantage of all parties.

Canadian "Tombstones"

AN interesting report has just been received in this country describing how the Canadian chemical industry dealt with the awkward task of adapting its nitrogen production programme for explosives to supplying ammonium nitrate for use as fertiliser. Although Canadian explosives plants filled an important gap in the Allied supplies, there was, after many new American plants had come into operation, a surplus capacity, which would have meant a serious curtailment of output had it not been for a concurrent world nitrogen shortage for fertiliser purposes. Canadian manufacturers purchased these surplus stocks for reworking into mixed fertilisers. Last Spring, when the United States experienced a severe fertiliser shortage, large quantities were sent across the border. One of the main difficulties that had to be overcome arose from the fact that the product caked almost immediately after it was packed. Canadian dealers, having no adequate crushing equipment, nicknamed the 100-lb. bags "tombstones." However, bearing in mind its valuable properties as a plant food and in order to avoid a sudden decline in nitrate output, quick measures had to be taken to maintain the market by improving the quality of the product. In the resultant operations, the value of exchange of technical information, both on a national and on an international level, was again demonstrated. Canadian scientists and production technologists, assisted by experts from the T.V.A. and the Hercules Powder Company, developed within no more than six weeks two new processes for the production of a satisfactory free-flowing form of ammonium nitrate.

Nitroprills

ONE of the great advantages of ammonium nitrate, as compared with sodium nitrate and ammonium sulphate, is its high content of available nitrogen —about 35 per cent. The task before the workers lay in overcoming the caking tendency of the product without appreciably reducing the proportion of available nitrogen. It is easy enough to mix ammonium nitrate with a granulating medium, such as gypsum or ammonium sulphate, but its special advantage is then lost. The successful solution lay in the "prilling" process by which particle size was increased. In the final product, known as "Nitroprills," into which the requisite proportion of dusting and coating agents— —chiefly diatomaceous earth—have been introduced, the available nitrogen content was reduced to only 32½ per cent. The successful and rapid conversion in this particular field augurs well for the much larger task of reconverting Canadian industries after the war.

SMOKE ABATEMENT

Encouraged by official support, the National Smoke Abatement Society has prepared its programme for the next five years, divided probably into three main sections—the formation of public opinion, further research on problems of air pollution, and the study of formulation of measures for smoke prevention. Some of the methods by which these objects will be achieved include new publications of general and specialised interest, national and local exhibitions, conferences and meetings, educational work in schools, research into economic losses and other consequences of smoke, and development of industrial fuel economy.

To enable it to attempt the programme envisaged the Society is appealing for support that will give it at least ten times its present income of about £1000 a year.

The Chemical Controls

Select Committee's Report

THE Eighth Report from the Select Committee on National Expenditure—Session 1943-44 (H.M.S.O., 2d.) is primarily concerned with the Chemical Controls of the Ministry of Supply. While the inquiry has not brought to light much that calls for specific criticism in the activities of the Controls, it is hoped that by the publication of the Report certain widespread misapprehensions may have been removed.

The following recommendations are made by the Committee: (1) The whole organisation of the Controls should be reviewed, and consideration given to the advantages of absorbing them into the headquarters of the Raw Materials Department. (2) The prepared lists of paint firms whose labour is protected, and to which Government Departments confine their direct orders, should be abandoned. (3) The allegations made by a certain firm concerning the operation of the Controls should be referred to a properly qualified tribunal.

In preparing the Report, it has not been possible to confine the inquiry strictly to the activities for which the Controllers and their staffs are responsible. Thus, evidence has been heard from various other Government officials, including the Director-General of Scientific Research and Development, the Ministry of Supply, the Director-General of Materials Production, Ministry of Aircraft Production. Memoranda were also submitted by certain trade associations and firms, and their representatives were heard.

Constitution of Controls

There are five Chemical Controls: Sulphuric Acid, Fertilisers, Industrial Ammonia, Molasses and Industrial Alcohol, and Plastics. The Miscellaneous Chemicals Control no longer exists as a separate entity, having recently been absorbed into the headquarters of the Raw Materials Department of the Ministry of Supply. The five Controllers form a Board, which is presided over by a chairman who is responsible for the co-ordination of their activities. The ultimate responsibility for the supply of practically all essential raw materials lies with the Raw Materials Department of the Ministry of Supply. Questions of finance, whether in regard to capital expenditure or the prices at which materials are to be sold, have to be approved by the Finance Department of the Ministry. In principle, therefore, the Controls are executive. They perform an important advisory function in what may be called the semi-technical field of trade and industry. They are concerned with every kind of action which the Department may be required to take to ensure supplies and their proper distribution and use.

In addition to a general supervision of the trade or industry with which it deals, a Control may initiate arrangements for any or all of the following purposes: (a) the importation of supplies from abroad; (b) the provision of new capacity in this country; (c) the distribution of materials, including the provision of special vehicles; (d) the rationing of supplies; (e) directing the purposes for which materials may be used; and (f) fixing the price.

Staff and Organisation

Staffs have been appointed in the main from persons who were formerly engaged in the businesses concerned. The Chairman of the Chemical Control Board is a director of the largest chemical company in the country. Three of the five Chemical Controllers are directors of companies engaged in the chemical industry, and two were officers of the corresponding trade associations. It is a condition of these appointments that the persons appointed cease "from any active participation in any business connected with the trade concerned, and in all circumstances the private trade interests of an official of the Ministry must be secondary to, and must not conflict with, his official duties and responsibilities." Although active participation in his former business is thus strictly forbidden, there is no rule against a director or executive continuing to receive remuneration from his firm. It is understood that many of those appointed from industry continue to be paid by their firms, and in such cases they usually give their services to the Ministry without salary. It is understood that a review of staff is now being made.

As to the organisation of the Controls as a whole, it is noted that the burden of work has now diminished. The supply position, generally, is less difficult, the creation of new capacity is unlikely, and the machinery of distribution, licensing and so forth has become stereotyped. It now becomes a question whether a Control organisation of the present type is really necessary, and whether the work could not be more satisfactorily handled directly by the headquarters of the Raw Materials Department. Apart from the economies likely to result, there would be positive advantages in knitting more closely together the organisation for dealing with materials whose manufacture and uses are so intimately connected as are those of sulphuric acid, industrial ammonia and fertilisers.

Criticism of the Controls has in the main,

it is stated, been of the vague kind which is content to imply that, because the staff of the Controls have been recruited from the trades and industries they now control, they must be influenced in their actions by their business connections. Little weight can attach to such broad generalisations, and it can safely be said that much of this criticism arises from ignorance of the true position of the Controls within the Government organisation—a state of mind which is perhaps encouraged by the title Controller with its suggestion of dictatorial powers. The Committee has, however, received a certain number of specific allegations mainly regarding the operation of one or two Controls.

Criticism of the Controls falls under four heads: (i) that existing capacity has not been fully used; (ii) that new capacity has not been distributed to the greatest advantage; (iii) that technical skill and facilities for research and development have not been sufficiently widely drawn upon; (iv) that attempts to concentrate the paint industry have not been properly carried out.

Neglect of Capacity

In many cases the explanation was simply that, in view of the paramount importance of conserving shipping space, it was preferable to import the material at a later stage of its manufacture rather than to import the bulkier basic material and process it in this country. This sufficiently accounts for the undenied fact that for several years of the war there was capacity in this country for manufacturing certain chemicals, which could have been, but was not, used. It was only later, when the demand for the finished material in North America became greater and the pressure on shipping space became less acute, that it became preferable, and in fact necessary, to put into use the capacity in this country. At the present time little of this capacity remains unused.

The Committee feels it a matter of some criticism that this could not have been made clearer to the firms which have complained of the neglect of their capacity. The fact that the firms in question appeared not to be aware of these explanations and continue to harbour a grievance against the Controls suggests that more account should be taken of the point of view of the manufacturer who feels that his desire to help the war effort has been frustrated.

In a number of cases where new capacity has been required for the manufacture of a product which has hitherto been the monopoly of a single firm, the Department has given the whole amount of the new capacity required to the same firm, either in the shape of extensions of their own works or of an agency factory to be managed by the firm on behalf of the Government. This procedure was justified by the Departments concerned as part of a deliberate policy. Where a firm has successfully been making a product in the past and also has the organisation to enable it to undertake the necessary expansion of capacity, it has been considered wise to entrust the creation and the management of the new capacity to that firm. With this policy the Committee agree, and they have already shown their concurrence in it in relation to magnesium production, where the Department departed from it. But the operative word is "successfully." If the product is one which is still far from perfectly developed, it becomes a question whether it is wise to entrust its manufacture and further development to a single firm.

The Case of "Perspex"

The committee had particularly in mind the case of methyl methacrylate clear sheeting, commonly known by the trade-name "Perspex." The manufacture of this product had been the monopoly of a single firm which holds a predominant position in the chemical industry. The technical experts of the Ministry of Aircraft Production reached the conclusion that Perspex was preferable to cellulose acetate sheeting by reason of its dimensional stability. Accordingly, it was decided that the additional clear sheeting required by the increasing aircraft programme should be provided in the form of Perspex, and that no more capacity for cellulose acetate should be laid down. Following their usual policy, the Directorate of Materials Production have given the whole of the additional capacity for making Perspex to the one original manufacturer. Doubt about the wisdom of this decision arises because the development of Perspex has been a long and difficult process, and even now it has not the strength which is regarded as desirable. Faster progress might have been made with the development if other firms had been brought in. A fresh approach to the problems might have resulted in greater progress towards a satisfactory solution. At least one such firm fully qualified for the task was in existence, but it was not asked to participate in the manufacture of Perspex, and its attempt to develop an alternative material was not encouraged.

In addition to the research and development carried out by private firms, much also is done on the basis of Government contracts for specific pieces of research. The volume of these contracts with industry has greatly increased, and some hundreds of such contracts have been placed since the war. The responsibility for placing extramural contracts rests with the Director-General of Scientific Research and Development at the Ministry of Supply. Of the research contracts placed with the chemical industry since the beginning of the war more

than half have been placed with one company and its associated companies; on the other hand, one of the largest firms in the industry and a leader in one field of organic chemistry has not received a single contract. That the former group of companies should have participated so largely in the programme of research and development is not perhaps remarkable in view of its position in the industry and its record in the field of research. That the latter firm should not have had a single contract requires some explanation. The explanation offered by the Director of Scientific Research and Development was that owing to the suspicious attitude of this firm his Department had not been able to acquire the necessary information about its facilities for research and development and had therefore not been able to award it contracts for such purposes.

The Committee is concerned whether considerable facilities for research and development have been neglected. That the firm should be suspicious of those officers of the Controls who are closely associated with rival firms was perhaps natural. But the officers of the technical departments responsible for the distribution of research contracts are in a different category. Although many of these officers have had some service in private industry as part of their experience, they have no present or prospective connection with industry and in any case they have been drawn from a field wide enough to ensure against the possibility of bias towards particular firms. Moreover, even if a firm should not have full confidence in the irtegrity of these officers, there are Government institutions, such as the Department of Scientific and Industrial Research, whose permanent position in the service of the State places their impartiality above suspicion. There are precedents for the use of these bodies in any case where a firm is disinclined to disclose information to the officers of a Department.

The Paint Industry

The Committee does not consider that the treatment of the paint industry has been satisfactory. If it was considered that redundant paint-making capacity should be closed, there should have been a proper concentration scheme. As it was, after what appears to have been a period of considerable vacillation, the system of lists was adopted, with the result that the firms not on the lists, which were in the main the small firms, were discriminated against in regard both to the protection of their labour and to their obtaining of Government orders. It is not considered that this result was either economical or fair. Since then direct orders for paints, other than certain special kinds, are no longer to be limited to firms on the lists. The continued existence of the lists, however, still results in discrimination between firms in regard to labour, and it is recommended that the lists should be abandoned.

In the section of the Report dealing with the use of existing capacity, attention is drawn to the need for giving more adequate explanations to manufacturers whose capacity for one reason or another it has not been possible to employ fully. In some sections of the chemical industry, notably in the fertiliser industry, there is an Advisory Committee of manufacturers and others, which performs a useful function in assisting the Control to settle both the programme and the way to carry it out. In other sections of the industry there is either no advisory committee or only an inactive or moribund committee. So long as Controls exist, it is of the greatest importance that they should retain the confidence of the industry; the existence of an advisory committee which is really active and consulted is an excellent means to this end.

A Tribunal for Complaints

There still remains a large volume of complaint from one firm in particular which cannot be disposed of simply. The subject of these complaints covers a very large area of matters in dispute. The elucidation of these matters would not only require a more extensive investigation than the Committee could undertake but would need a quasi-judicial inquiry, which they are not equipped to carry out. The committee, therefore, recommends that these complaints should be referred to a properly qualified tribunal with power to hear parties by counsel.

The criticisms relating to the distribution of new capacity and the utilisation of facilities for research and development raise large issues outside the scope of this inquiry. On the whole, the operation of the Chemical Controls has tended to strengthen rather than diminish the preponderance of the strongest interests in the chemical industry. Though it is undeniable that the vast resources of the interests in question have been of the greatest service in the national effort, there is a danger that too much reliance may be placed on the strength of a single concern. Purely from the point of view of production this concentration of resources may not usually be disadvantageous, but it makes difficult the control of costs by the Department, since in the case of many products there is no standard of comparison and overheads are difficult to calculate.

United States consumption of commercial nitrogen fertiliser rose from 19,000 tons in 1880 to about 400,000 tons per annum in recent years. Consumption for the current year is estimated at 625,000 tons and will probably exceed the 700,000-ton mark in the new year.

SAFETY FIRST

Personal Safety in Handling Chemicals—II

By JOHN CREEVEY

RUBBER gloves and gauntlets are needed normally when handling acids, alkalis, and other caustic materials which may exert an injurious effect on the skin. But there may be some additional rough usage to be taken into account when selecting the glove. For example, it may be necessary for a man to clean the rough and badly corroded exterior of a tank which has been holding acid or some such liquid, and in these circumstances it is likely that the rough work as well as the surfaces which come in contact with the gloves will cause the rubber to wear away very quickly—indeed, not only to wear away, but also to become cut and punctured, so that it becomes easy for liquid to reach the interior and affect the hand. The same thing applies where repairs are being done on plant that has a rough exterior surface, where there is at the same time the necessity to give protection against corrosive or caustic liquids, perhaps especially with workmen lacking the common care of a person who is daily in contact with such materials. In these cases, the rubber gloves should have an over-glove of leather to give the needful resistance against cuts or punctures. It is sometimes difficult to find a glove which is sufficiently sturdy and tough to stand rough usage, and still be pliable enough to allow the fingers to be used freely.

The Hazard of Clumsiness

A glove must allow the hand to grasp things in a normal manner, so far as possible. But in handling objects it is not only a matter of holding them; there must also be sureness of touch, which is masked when any ordinary glove is worn. Clumsiness in handling objects, due to ill-fitting gloves or those which are too thick to allow indication (something distinct from sensation) of touch, is often the direct cause of objects being dropped upon the feet; there is also the possibility that an object may be slippery in contact with the surface of the glove material, as experience shows—for example, when the rubber soles and heels of an ordinary pair of shoes come in contact with well-worn wet paving-stones.

All rubber gloves should be long enough to pass over and beyond the wrist of the wearer, so far that they overlap the sleeve of shirt or overalls. Sometimes it is advocated that they pass *under* the sleeve of the working garment, for there is then less likelihood of trapping any liquid so that it passes down the inside of the glove and so reaches the hand; for the same reason there must be no gap exposing the wrist of the wearer. A pair of rubber gauntlets which are very long, and also notably wide at the opening for the hand (which may be necessary to accommodate sleeves), may prove to be hazardous, because they are likely to be caught in any moving machinery that may approach close to the arm, although moving parts if they present any hazard should be guarded as in normal safety practice.

Care of Rubber Gloves

As to the proper care which should be given to rubber gloves for chemical works' use, first see that the glove fits the hand, because that is something which goes far towards retention of good shape and freedom from tearing or cracking under stress of use. There is a correct type of glove for almost every purpose, and also a range of sizes, so that there is really no valid excuse for an ill-fitting glove. An ill-fitting rubber glove, or indeed, any glove of any material used industrially, greatly impairs the efficiency of the wearer. It is subject to more rapid deterioration, and is often the cause of accidents—not merely the risk of dropping a heavy object upon the feet, but perhaps a more serious accident involving a bowl of hot liquid (which contacts fellow workers), or even an accident caused by inability to turn off a valve as quickly as needful (with consequent overflow of corrosive liquid).

To remove the gloves from the hand, peel them off so that the sleeve or wrist turns back over the hand and the rest of the glove peels from the palm of the hand and then allows the fingers to slip out without trouble. In no case remove rubber gloves by just pulling them off, taking hold of fingers; this stretches the rubber badly, and weakness in all parts of the glove will soon result. Again, rubber gloves wear better if there are two pairs to use alternately. Before putting on the gloves, dust them well on the inside with talc powder; this prevents any tackiness which is a characteristic of rubber in contact with the skin; also see that the hands are quite dry when slipped into the gloves. The talc powdering is best done when the gloves are removed for hanging up at the end of the working shift, after first rinsing away all traces of liquid as well as dirt from the outside. An accumulation of dirt

(*Continued on p.* 487)

Factories in 1943

The Chief Inspector's Annual Report

EXPRESSED as usual in agreeable English, and free of civil-service jargon, Sir Wilfrid Garrett's Report for 1943 is an interesting as well as an important document, well worth the shilling charged for it. We recommend all executives in the chemical industry to read it *in extenso*; a few of the salient points are recorded here to give an idea of its wide and varied scope.

Communal Factories

Smaller concerns in the chemical industry may be affected, very much to their benefit, by a development in post-war planning that is mooted in the introductory section. This is the development of communal factories, an adaptation of the idea of the tenement factory on better lines than the history of that word would suggest. How often have we not all seen small chemical works "driven by economic necessity into old and dilapidated domestic property quite unsuitable for factory purposes?" The new scheme aims at abolishing all that sort of thing; the intention is to build blocks of well-designed rooms of convenient sizes with good facilities for heating, ventilation, lighting, etc., that can be let off to the smaller type of factory occupier—among whom the chemical manufacturer is not the least important. Communal canteens can be provided, and the advantages of modern lay-out, power, hoists, and other economic labour-saving devices can be enjoyed. Such factories may go a long way also towards solving the transport problem of our large industrial towns.

Decrease in Accidents

A striking fact of the year under review is that, for the first time since 1938, there has been a decrease in the total number of accidents reported, while the decrease in fatalities, noted in the previous year, has been maintained. Fatal accidents in 1943 were 1220 in number, a decrease of 10½ per cent. on the figure of 1363 for 1942. Non-fatal accidents showed a decrease of 1.1 per cent.; the figure was 309,924 against 313,627. The total number of accidents to adult women, however, continues to show an increase (from 71,244 to 73,065). This is believed to be due partly to the rise in the aggregate of workers of this class, and even more to the fact that many of them have been transferred to the principal armament and munitions industries from those with a lower accident risk. Despite this it is reported that there has been a fall of about 0.3 per cent. in the accident rate of women employed in those munition industries which are the chief sources of accidents to women. It still has to be recorded that "in spite of helpful press notices last year, the current fashions in hairdressing remain about as unfortunate as they could be for a period when so many additional women are working in machine shops."

The number of accidents to young persons has fallen compared with 1942, after a steady rise during the previous war years. Sir Wilfrid stresses in strongest terms the importance of training for industry. One of his Inspectors remarks, in this connection: "A lad should be prepared for the employer who orders him to dispose of inflammable waste on an open brazier." Pre-industrial training is on the whole good, but the training given in the factories themselves is often still very poor.

Cases of gassing from various industrial vapours are dealt with in the medical section of the Report, but the increase in cases of carbon-monoxide poisoning has received special attention. Analysis has not revealed any special cause or causes, and the only conclusions to be drawn are (i) the tendency of operatives to take greater risks in the rush of war, and (ii) neglect of the care usually taken in repair of plant. Gasworks and coke ovens have a very good record in this respect; but it is noted that the gas at both these types of works has a much lower CO content than that in blast furnaces and producer-gas plants.

Special Investigations

Special problems that have had to be tackled—many of them involving secret processes—involve radio-active substances and X-rays, light metals, and leaded petrol. These are dealt with more fully in the medical section, but it is noted that arrangements were made with the National Physical Laboratory for a voluntary test for workers with radio-active substances; that old and new explosion risks when working with magnesium and aluminium powder were investigated; and that the health risks involved in handing lead tetraethyl have been fully gone into. A field investigation to examine the health risks that may be associated with plain steel welding has been undertaken, as a result of representations made by the trade unions concerned. Other matters on which the Department has been consulted include the dangers of explosion in the manufacture of potato flour, in grain drying, and in the manufacture of ferromanganese; and the hazards connected with the solvents used in making self-sealing tanks for aeroplanes, and with the laying of pitch-mastic floors. Adequate ventilation by

the provision of localised exhaust draught—the "fume cupboard" system—has been encouraged. Interest in the use of colour in factories is growing, and the principle, general in chemical works, of using distinctive colours to pick out certain pipes, is being suggested as a means of dealing with definite hazards in other circumstances.

Health in the Factories

In the medical section of the Report, Dr. E. R. A. Merewether describes the work of his staff as "a year of technical effort paralleling a new high peak of production on the Industrial Front." Exceptional efforts are required to prevent a serious lag between the birth of an occupational hazard and the application of preventive measures, so rapid is the pace of invention and discovery. The matter is made no easier by the scarcity of persons suitably qualified to apply the principles of industrial health within industry: doctors, engineers, chemists, physicists, and welfare experts are only a few of the specialists needed to deal with this complicated and composite subject.

Nevertheless, the results recorded, largely because of the appreciation in industry of the needs of industrial health, are noteworthy. The Pottery Industry has instituted alumina as a substitute for flint in the placing of china; and research bodies in the steel industry have mobilised their resources with a view to substituting, where possible, non-siliceous for siliceous materials. Another great industrial concern has drawn up plans for a pilot plant for the manufacture of benzidine with the aim of entirely preventing exposure of the workers to carcinogenic agents. In general, many dangerous processes have been put into production only after joint consideration by the industrial side and the health side, with the simultaneous installation of protective measures. Certain plants, on the other hand, have been erected without thought of the inherent risks of the process, with the result that fatal explosions or poisonings have ensued.

Industrial Poisoning

Some particulars of notifiable industrial poisoning or disease are appended. Lead poisoning cases numbered 46 (five fatal), the lowest figure ever recorded. One firm, following a case of poisoning, instituted a check of safety measures by means of periodical estimations of the lead content of the air in the shop concerned, with satisfactory results.

Two cases of jaw-necrosis from phosphorus were noted. Black-out conditions had led to unsatisfactory ventilation, and an elaborate system of ventilation has now been installed. Two cases of arsenical poisoning occurred; in one of the factories concerned local exhaust ventilation and periodical examination of workers have been instituted. Mercurial poisoning accounted for four cases, two only slight, these last being due to fulminate in the process of drying.

Of the 16 cases of toxic jaundice, 14 (three fatal) were due to TNT, one to dinitrotoluene, and one (fatal) to chlornaphthalene in a chromium plater exposed intermittently to a wax obtained from a firm that had ceased to exist. This, on analysis, proved to be tetrachlornaphthalene. TNT was responsible also for six cases (four fatal) of toxic aæmia.

Chrome ulceration cases rose markedly from 89 in 1942 to 226 in 1943. This is accounted for by a new process of manipulating sodium chromate. Two cases were accounted for by the manufacture of chromic-oxide/copper-oxide catalyst. Of the 160 cases (15 fatal) of epitheliomatous ulceration, 111 were due to pitch or tar, 48 to mineral oil, and one to shale oil.

Cases of aniline poisoning (none fatal) fell from 204 to 79; of these 62 were due to TNT, eight to aniline, three to nitro- or dinitrobenzene, two each to chloraniline and orthotoluidine, and one each to dinitrochlorbenzene and paranitraniline. A fatal case of chronic benzene poisoning occurred with a worker who had spent 19½ years spreading cloth with a benzene-containing celluloid rubber solution. A case of manganese poisoning—only the second since this condition became notifiable in 1936—was reported in respect of a worker who had been employed for two years in crushing ferromanganese.

The health of luminisers has been uniformly good. The danger of slight chronic dermatitis from handling radio-active substances has been checked by transference temporarily to other work, and the dental-film test evolved by the National Physical Laboratory to identify any cases with a dosage above the tolerance dose of 1 Roentgen per week has enabled blood examinations to be made when necessary.

Gassing

Cases of gassing numbered 695 (against 776), with 27 fatal (against 25). Carbon monoxide (231 against 249) and nitrous fumes (135 against 220) were responsible for the largest quantity, as usual. Chlorine, with 58 cases (one fatal), and trichlorethylene, with 87 (three fatal) reached a higher level than ever before. It is noteworthy that 16 of the chlorine cases were due to escape from a special metal chlorination process at one factory, while 62 of the solvent cases were attributable to the overheating of a metal-degreasing plant due to thermostat failure. Similarly, of the 30 cases of nickel carbonyl poisoning, all were at one factory, 19 being due to a temporary mechanical defect when decomposers were

being emptied. The accidental dropping of a cigarette caused seven cases of cadmium oxide poisoning from the firing of fine metallic powder. Dinitro-orthocresol was responsible for a series of cases in one factory: in paste form this product had caused no trouble; but when dry mixing was instituted for the preparation of an anti-locust compound, distressing symptoms were noted at once. Local exhaust ventilation and periodic examination scotched the trouble. Attempts to discover an easily accessible source of potable alcohol led to two cases of metacetaldehyde poisoning (one fatal) and to two deaths from ingestion of ethylene glycol.

Dermatitis cases due to chemicals fell from 2824 to 1706. A sub-committee was set up to consider "basic formulæ" for barrier preparations, and the Pharmaceutical Society was approached as to the possibility of including suitable formulæ in the Codex.

Reference is made to cases of lead poisoning occurring from the mixing of lead tetraethyl with petrol, though the cases notified belong to 1944. Suitable precautions devised by the Ethyl Corporation have led to the blending being carried out without incident, and the licensing system introduced by the Ministry of Fuel has prevented its use as a solvent, etc. In certain instances, however, the testing of carburettors was carried out with leaded petrol without effective preventive measures, and the cases mentioned occurred. Within 24 hours of the report, steps were taken in the factory concerned to substitute unleaded petrol for testing, and the Ministry of Aircraft Production issued a general direction to cease using leaded spirit for the purpose.

Welfare

A final word on the Report may be said, to accentuate the fact that such importance is now assigned to Personnel Management and Welfare Supervision that a special chapter, by Miss F. Isabel Taylor, is devoted to the subject, with a section on Canteens, by Miss D. Johnson. This move will be heartily welcomed; the subject has long been in the forefront of matters concerning progressive industry, and THE CHEMICAL AGE is glad to note that the ideas expressed coincide so nearly with those that have been voiced in our own pages.

Parliamentary Topics

Empire Penicillin Production

IN the House of Commons last week, Mr. A. Edwards, who asked about penicillin production and supply, was told by Mr. Emrys-Evans that production was, at present, confined to Canada and Australia. Two Government and one privately owned plant operate in Canada; their output was used exclusively for Canada's armed forces. Supplies for civilian needs were imported from the United States and sold at fixed prices. In Australia, the Commonwealth Serum Laboratories commenced production last January and, since May, there was a surplus available for civilian needs. New Zealand received some supplies from Australia; however, local production was under consideration. South Africa relied entirely on imports.

Pottery Industry

Mr. Ellis Smith, who asked a question regarding the Pottery Industry, was told by Mr. Dalton that he was in consultation with the industry regarding both the re-opening of closed potteries and export problems.

International Cartels

Mr. Neil Maclean asked the President of the Board of Trade whether he had under consideration for post-war trade the prevention of agreements between British trading organisations and foreign trading organisations, which would be detrimental to the interests of the British public; and whether he would institute a public inquiry into the operation of cartels and the connection of British firms with foreign firms in the organisation of such trade combinations.

Mr. Dalton: No public inquiry will be made into this matter, but I hope that it will be possible to introduce legislation next Session on the lines proposed in Paragraph 54 of the White Paper on Employment Policy.

Industrial Dermatitis

In reply to Mr. Cocks, the Home Secretary stated that the number of cases of industrial dermatitis amounted to 272.

Scientific Missions (Dominions)

Captain Strickland was told by Mr. Emrys-Evans that there were, at the present time, no special U.K. scientific missions in the Dominions, but that frequent visits were paid by individual scientists and that close liaison was maintained with Dominion representatives in London.

Cinchona Production (India)

Mr Amery, replying to Sir G. Jeffreys, said that before the war 4500 acres were planted with cinchona enabling India to cover 40 per cent. of her quinine requirements. By next year, about 8000 acres will be planted and extraction will begin by the end of 1945. While quinine supplies were not equal to demand abundant supplies of synthetic anti-malarials were reaching India.

Personal Notes

MR. E. K. SAMWAYS, B.Sc., B.Pharm., Ph.C., A.R.I.C., technical development manager of Allen & Hanburys, Ltd., has been elected F.R.I.C.

MR. D. L. BOOTH, a former chairman of Beeston & Stapleford U.D.C., was elected a member of the Notts. County Council. Mr. Booth is employed in the drawing office of Messrs. Boots Pure Drug Co., Ltd.

SIR DAVID MILNE-WATSON, Bart., has resigned, for reasons of health, his appointment as managing director of the Gas Light & Coke Company. MR. A. E. SYLVESTER now becomes sole managing director.

MR. WILLIAM JOHN WOODGATE, manager of the chemical department of Baird & Tatlock (London), Ltd., is retiring owing to ill-health, after fifty-three years' service. Mr. Woodgate, during his long service, has watched the company's steady progress, from a total of eleven employees in 1891 to the present figure of over 800. A dinner given in his honour at the Waldorf Hotel on November 3 was attended by about eighty, including directors, senior executives, and long-service employees.

MAJOR GLANVILL BENN has been elected chairman of Benn Brothers, Limited, proprietors of THE CHEMICAL AGE and associated journals, in succession to the late Mr. Gordon Robbins. MR. NORMAN FRENCH is appointed managing director, and MR. BASIL H. TRIPP a full director of the company. SIR ERNEST BENN will act as chairman of the board pending the return of Major Benn from active service. Major Edward Glanvill Benn is the fourth chairman of the well-known publishing business since its establishment 64 years ago. Sir John Benn was succeeded by Sir Ernest Benn in 1922, and in 1941 Mr. Gordon Robbins (who had been deputy-chairman since 1927) was appointed to the position. His untimely death has necessitated the above changes. Major Benn has been successively managing director of Ernest Benn, Ltd., editor of *The Newspaper World*, and managing director of Benn Brothers, Ltd. Joining the East Surrey Regiment in 1940 he was marked for rapid promotion and went through the Staff College. For the past year as Brigade-Major he has been on active service with the C.M.F.

Major Glanvill Benn.

The Copley Medal of the Royal Society has been awarded, for 1944, to SIR GEOFFREY TAYLOR, in recognition of his many contributions to aerodynamics, hydrodynamics, and the structure of metals. The Royal Society's Davy Medal for 1944 goes to SIR ROBERT ROBERTSON, in recognition of his researches on explosives, analytical methods, the internal structure of the diamond, and infra-red absorption spectra. DR. C. R. HARINGTON has been awarded a Royal Society Medal in recognition of his work in the analysis and synthesis of thyroxin and in immunological chemistry.

The constitution of the Fuel and Power Advisory Council, which advises the Minister of Fuel on questions referred to them by him from time to time, is now announced to be as follows: SIR ERNEST SIMON, M.Inst.C.E., M.I.Mech.E. (chairman); MR. GEOFFREY CROWTHER; SIR JOHN GREENLY, K.C.M.G., C.B.E., M.I.Mech.E., M.I.E.I.; DR. E. S. GRUMELL, C.B.E.; SIR HAROLD HARTLEY, K.C.V.O., C.B.E., M.C., F.R.S.; PROFESSOR C. N. HINSHELWOOD, F.R.S.; PROFESSOR JOHN JEWKES, C.B.E.; VISCOUNT RIDLEY, C.B.E.; SIR ROBERT ROBINSON, F.R.S., D.Sc.; and MR. GEOFFREY SUMMERS, C.B.E. Secretary, MR. R. N. QUIRK.

The Nobel Prize for Chemistry for 1943 has been awarded to PROFESSOR GEORG HEVESY. By birth a Hungarian, Hevesy studied at Budapest, Berlin, and Freiburg, and in 1926 was appointed Professor of Physical Chemistry at Freiburg University. He left Germany for Copenhagen when Hitler came to power, and is now a refugee in Stockholm. In addition to his researches in electrochemistry and radioactivity, in 1923 Hevesy, with Professor Dirk Coster, of Groningen, discovered the metallic element hafnium by the detection of unfamiliar lines in the X-ray spectrum of zirconium minerals. The award of the 1944 chemistry prize is reserved.

Obituary

DR. JOHN TODD MORRISON, who died at Stellenbosch on October 24, was Professor Emeritus of Chemistry and Physiology, at the University of Stellenbosch, Cape Province, South Africa.

MR. ALFRED TIMNEY, of Cullercoats, well known in the North of England as a metallurgist and analytical chemist, died on November 8, aged 71, after an operation in Newcastle Infirmary.

A brief announcement of the death on October 27, of DR. THOMAS SWINDEN, the distinguished metallurgist and chemist, was included in our issue of November 4. A correspondent has now sent us some further details of his career and of his services to science, especially in the development of the iron and steel industry. Dr. Swinden's death was a direct outcome of the war; as a man who never spared himself in his work, he subjected himself to great additional strain in order to meet the demands of the nation's effort. Counselled by his medical advisers to take a complete rest, he followed this advice, but after about six months he returned to duty, having apparently completely recovered his health. His sudden death in the Stocksbridge Works of Samuel Fox & Co., Ltd., came as all the more of a shock to his family and his colleagues.

In addition to the honours and appointments in our previous notice, Dr. Swinden held the M. C. James Medal of the North-East Coast Institute of Engineers and Shipbuilders, and the Silver Medal of the Institution of Marine Engineers. He was a Freeman of the Cutlers' Company, a founder member and member of Council of the new British Iron and Steel Research Association, and a member of Council of the British Standards Institution; and he served on the committees of innumerable research movements and Government advisory panels connected with metal production in all its aspects. He was a director of the Distington Hematite Iron Co., Ltd., and of the British Magnesite Corporation, Ltd.

Dr. T. Swinden

Those who know best cite his research department at Stocksbridge as containing one of the finest sets of equipment to be found in an industrial laboratory in this country.

Dr. Swinden leaves a widow and two sons. Alan, the elder, is an engineer specialising in the design of A.F.V.'s, while Roger, the younger, follows his father's profession as metallurgist in one of the United Steel Companies' branches.

Personal Safety in Handling Chemicals

(Continued from p. 482)

on rubber gloves is likely to set up a condition which facilitates the action of acid or alkali, and particularly if coming in contact with grease, or oils, or solvents. Rubber gloves should be hung up by a spring clip fitting just inside the opening; never leave them lying about flat unless momentarily when in use; never place them where something heavy may be put on top of them accidentally. For cleansing the gloves after use, rinse them in running water while wearing them, and then (with the hands still in them) wash the outside with lukewarm water and a good-grade cleansing soap; finally, rinse in cold water, hang up to drain, and later dust the insides ready for future use.

Keep rubber gloves away from contact with organic solvents, because these liquids often exert a solvent action on rubber, as you will find if the nature of the work for which you use them brings them into unavoidable contact with solvents. If contact with solvent liquids is inevitable, then additional protection can be obtained by using a protective paste of suitable composition.

Snips and snags in the surfaces of rubber gloves, as well as any more serious tearing, should be patched as soon as noticed. There should be a periodical inspection of all rubber gloves in use at any works, and inspection by someone apart from the users. If the tear is a bad one and on the fingers it will be best to discard the glove so far as use for the worst conditions is concerned, and use it only for work of lesser importance; any patch which is applied may not stand up to what is required of it in service. Indeed, it is never considered safe to put patches on the fingers or palms of rubber gloves used by electricians, and to some extent this rule applies also to gloves coming in contact with the most dangerous of corrosive or caustic liquids. Patched gloves should be tested frequently to see that there is no leakage.

A CHEMIST'S BOOKSHELF

THE EFFICIENT USE OF FUEL. London: H.M. Stationery Office. Pp. 807. 12s. 6d.

This long-awaited official publication, containing the subject matter of the discussions, lectures, brains-trust meetings, etc., arranged up and down the country by the Ministry of Fuel and Power, has at last appeared.

Each of the 34 chapters into which the book is divided has been submitted for approval or criticism to a panel of experts. The nature and properties of all industrial fuels, solid, liquid, and gaseous, are discussed, together with the effects of combustion. Information is given on such important matters as draught and chimney design, combustion technique, air supply and flue gas composition, clinker formation and prevention. The transmission of heat and the calculation of fluid flow are explained at some length; an important section published for the first time is the complete analysis from first principles of the flow of gases in a furnace system. Steam production, including boiler practice and testing, and steam utilisation are comprehensively treated. The measurement of fuels (solid, liquid, and gaseous) and of steam is described and particulars are given of how to make measurements on site. Six chapters are devoted to furnaces, including gas producers, the application of fuel to special industries, electric furnaces, waste heat boilers, and refractory and insulating materials. The final chapter discusses the selection of the various fuels for industrial purposes. This valuable book should be within reach of everyone connected with the technical or administrative side of every works, it is to be hoped that if another edition is published, the general standard of production will be improved.

SCIENCE AND SALVAGE. Ed. Claus Ungewitter. London: Crosby Lockwood. Pp. 183. 12s. 6d.

This book is a translation of a German series of treatises entitled *Verwertung des Wertlosen*, literally "Making Valuable the Worthless." It is a remarkable record, reviewing the whole field of achievement in the production of valuable materials from the air, the sea, and the forest, and the relentless salvage of raw material from any kind of waste. It contains valuable economic lessons for Great Britain, which imported before the war £400,000,000 of raw materials, and wasted by-products in all directions. One of the twelve chapters touches on the recovery of various types of scrap; others deal with wealth from the air, such as synthetic ammonia, helium and other gases; with the sea as a source of raw materials; with forest products; and with the utilisation of by-products from chemical manufacture. Here two main groups of processes are distinguished according to whether, in the course of treatment, entirely new products are obtained or whether only a recovery of already existing raw materials takes place. Necessity is the mother of invention and the war has brought into prominence the utilisation of waste, the regeneration of old materials, and the development of low-grade natural raw materials—tasks to which chemists have always contributed greatly. The survey in this book, although brief, is comprehensive, and it shows that salvage, which has become a key word during the war, can also play an important part in peace-time.

ORGANIC SYNTHESES, Vol. 24. An annual publication of satisfactory methods for the preparation of organic chemicals. Editor-in-Chief, Nathan L. Drake. New York: John Wiley & Sons; London: Chapman & Hall. Pp. 119. $2.

Organic Syntheses started on a high level and have kept it throughout the 24 volumes published so far; and the reputation of this useful work has grown with it so that nowadays it requires no specific recommendation. Those who have to perform syntheses of organic compounds well know the merits of the work. In the book under review the preparation of 37 compounds is described. From the point of view of complexity they range from *tert*-butyl acetate (from *tert*-butyl alcohol and acetic anhydride) to 3 : 12-diacetoxy-*bis-nor*-cholanyldiphenylethylene; and they include several substances of an immediate commercial importance. The yields are, with some exceptions, within the range 10-100 grammes.

It is unexpected to find in a book published in U.S.A. in 1944 the statement that "acenaphthene obtained from the Gesellschaft fuer Teerverwertung, Duisburg-Meiderich, Germany, may be used." In another respect also the volume bears no traces of war; although it has been manufactured "in the interest of the conservation of paper," etc., the paper is of a durable quality, the margins are generous, and the binding appears to be as good as in the pre-war issues.

MESSRS. J. W. TOWERS & CO., LTD., Widnes, have issued a new price list of their Towers Tested Analytical Reagents. These reagents are packed in standard sizes, and users are advised to purchase as far as possible in these sizes, as the packing is done at the works immediately after manufacture, thus avoiding risk of contamination. It is noted that owing to the constant change in market prices, the makers reserve the right to alter prices without notice.

Corner Cubes

Optical Application for Plastics

A NEW optical application for plastics has been developed by Imperial Chemical Industries to meet an urgent Service requirement. In November, 1943, there was a sudden demand for special tetragonal prisms in large quantities, for work connected with the invasion of Europe. Glass prisms had been considered, but insufficient glass-working equipment was available to allow deliveries to be made at the required rate. The only way in which the prisms could be prepared appeared to be by the use of a transparent plastic, and I.C.I. were asked to consider the manufacture of these "Corner Cubes," as they are called, in "Transpex," the special optical quality of the methyl methacrylate sheet usually known as "Perspex."

The Corner Cube is an optical device which was used successfully in the last war. Imagine an accurate cube cut from a block of transparent material, and a prism formed by cutting off one corner of this cube, followed by polishing this sheared face. This Corner Cube has the property of reflecting back along the same path any light ray which is incident upon the sheared face by reason of the inclination of its faces relative to each other. The maximum angle of incidence from which a reflected beam will still be received will depend on the "critical angle" which is itself determined by the refractive index of the material.

Rapid Methods of Production

The enormous number of prisms required in a short period demanded some rapid method of preparation. The first problem to be studied was the accuracy of the angles of the prism which would give the most suitable reflected beam distribution. Corner Cubes, with the required one-inch edges, of varying degrees of accuracy, were prepared from blacks of "Transpex" in the laboratory. Prisms of high optical accuracy gave most remarkable effects, it being possible at 100 ft. range to bring back the rays to within a 4-in. diameter circle round the source of light, with practically a complete blackout at any point outside this circle.

Much experimental work was necessary before a sufficiently rapid method of manufacture was devised. It was finally decided to use a high-speed milling machine, giving a smooth machined finish to the prisms, followed by a light buffing. Two-inch wide strips were cut from sheets of "Transpex," ¾ in. thick, by a band saw. Roughly shaped prisms were sawn from these by means of jigs. A bank of 15 small specially designed milling machines was prepared and ran at 6000 r.p.m. with a daily capacity of 6000 Corner Cubes. The rough prism was clamped in a holder at the correct angle relative to the cutting tool, which carried it along automatically until the machining on that particular face was completed. A considerable quantity of cooling liquid was used throughout the machining to prevent burning of the surface of the "Transpex." As soon as that face was completed, the prism was turned round through 120° to allow the next face to be machined and so on, until the three faces were completed. The fourth face, the one to be exposed to the incident rays, was the original face of the sheet.

For Service use, stout cases containing one and six prisms respectively were required. Accordingly, it was decided to mould heavy cases in phenol formaldehyde, sealed round the joints with a waterproof compound.

It was possible to complete the work in the very short time allowed only with the willing co-operation of the sub-contractors. The instruction to proceed was received at the end of February, 1944, and early in September the full quantity required had been manufactured, in spite of the fact that the quantities were doubled half way through the completion of the first contract. The whole of the design work and supervision was carried out by I.C.I., who also assembled the components. Of the sub-contractors, Thomas Holt, Ltd., of Rochdale, textile machinists, deserve special mention, as they prepared in record time and then operated the 15 milling machines. The moulds for the mountings were prepared by the Streetly Manufacturing Co., Ltd., Insulators, Ltd., and Joseph Lucas, Ltd., and the mouldings were made by the same companies, and by Ashdowns, Ltd.

"Corner Cube" prisms ready for fitting into their active-service case.

General News

From Week to Week

With the opening of Antwerp facilities for increasing supplies of Spanish and North-African haematite ore to North-West of England smelters will become available.

Triplex Safety Glass subsidiary, Quickfit and Quartz, Ltd., has produced "some most interesting results" and extensions of factory space are contemplated, according to the chairman.

At the first Lister Memorial Lecture of the Society of Chemical Industry, delivered at Edinburgh University on November 9, Sir Alexander Fleming described his discovery of penicillin in 1929 and exhibited some of the equipment used in his researches.

"Extenders for Natural and Synthetic Rubbers" is the title of Manufacturers' Memorandum No. M.10, issued jointly by the Ministries of Supply and of Aircraft Production and by the Admiralty. Research, on which the Memorandum is based, has been carried out by I.C.I., Ltd. (Dyestuffs Division).

The Iron and Steel Control have now published summaries of the price schedules for heavy steel products, rolled and re-rolled steel products and cold rolled strip, which can be obtained from the Iron and Steel Control, Ashorne Hill, Leamington Spa, or at Steel House, London.

"Don't Ease Up" is the title of the latest factory poster issued by the Fuel Efficiency Committee of the Ministry of Fuel and Power. Considering the latest coal-production figures, the general tendency to relax that is evident to-day, should not be encouraged, at any rate in fuel economy, in view of the hard winter that lies ahead.

Mr. Charles Brown, who has been appointed secretary of the Institution of Factory Managers, announces the removal of the secretariat to London—63 Gayton Road, Harrow, Middlesex. The Council of the Institution meets in Birmingham on November 18 to consider the development programme, including the issue of a brochure in order to secure wider knowledge of the Institution's activities.

Penicillin filtrate made by Roche Products, Ltd., has been tested by A. J. Hobson and L. D. Galloway, who suggest that there is a large field left for the use of penicillin filtrate, which should be cheap and plentiful, in the form of penicillin dressings for the treatment of fresh burns, abrasions and surface wounds, acute skin infections and dirty chronic ulcers. Experiments are in progress with a dried dressing impregnated with crude penicillin of a strength greater than that used in the earlier investigations.

The monthly lunch-hour service arranged by the vicar of Speke, the Rev. W. H. Wade, at the factory of Messrs. Evans, Son, Lescher and Webb, was addressed on November 8, by the Bishop of Liverpool, Dr. C. A. Martin. This was the first factory service he had attended since becoming Bishop.

The Birmingham and Midlands Section of the Royal Institute of Chemistry has arranged two free Christmas holiday lectures for children. The lectures will be open to senior pupils of secondary schools and senior elementary schools, and will be held on January 2 and 5, 1945, in the afternoon, in the Town Hall. A limited number of seats will be available for adults at a nominal charge.

The second number of *Standards Review*, the quarterly organ of the British Standards Association, maintains the excellent level of contents and production which was set by the first issue. The need for a national standards organisation in every country is stressed in a short article; others forecast the provision of a complete series of standards for wrought aluminium alloys, and describe the principles of the Flow Measurement Code. The recent retirement of Mr. C. D. Le Maistre, C.B.E., from the chairmanship of the executive council is recorded by a brief congratulatory message and an excellent portrait.

Foreign News

In Chile, the Cia. Chileña de Fósforos has established a new factory for the manufacture of paper matches.

"Vinylite," a plastic developed by Union Carbide and Carbon Corporation is to be used in the manufacture of shoes for next spring in America.

The value of Chile's imports of chemical products and paints decreased from 96,304,700 pesos in 1942 to 82,724,000 in 1943. Exports of chemicals, however, increased substantially from 9,948,900 pesos in 1942 to 16,304,300 in 1943.

A new plant for the production of phenol-formaldehyde plastics from home-produced raw materials, has been established in Bilbao by the Union Química del Norte de España S.A. Another plastics factory has been started in Bilbao by the Rocargo S.A., while Industrias del Acetato de Celulosa S.A. has taken up the manufacture of cellulose acetate and acetate rayon. The Resinera S.A. has set up a factory for the production of celluloid in Santander, while the Soc. de Industrias Químicas y Farmaceuticas S.A. is to produce synthetic phenol and synthetic camphor.

Carotin is being added to butter as well as to margarine in Germany, and the addition of vitamin A to margarine has been increased, according to an announcement by the Reich Food Estate.

Large veins of chrome ore, discovered last year in the Sarugun District, Hokkaido, Japan, are to be exploited by the Teikoku Manganese Mining Co. The metal content of the ore averages about 50 per cent.

Zinc with a purity of at least 99.995 per cent., from the electrolytic treatment of zinc amalgam obtained from zinc-containing lyes, is claimed to be recovered by the I. G. Duisburger Kupferhütte, according to German Pat. No. 741,746.

Industrial development was in the forefront at a recent committee meeting of the Caribbean Research Council. The most important raw materials were listed as follows: bauxite, manganese, sugar cane, timber, sand for glass-making, and kaolin.

In Germany, where production of articles from plastic materials was curtailed some time ago, a special production permit to be issued by the plastic materials group has been introduced by a recent decree. The manufacture of dies also requires a permit.

A small party, comprising scientists and administrative officers, under Lieut.-Cdr. J. W. S. Marr, who since last April have been carrying out scientific research and survey work in the Falkland Islands' Dependencies, is to be reinforced. The study of the possibilities for an exploitation of minerals forms part of their task.

The Ceylon Department of Agriculture has planted 50 acres of land in the Nuware Eliya district with pyrethrum. Output is sufficient to meet the requirements of the medical department, at whose initiative the project was undertaken. Planters in the district are said to show interest in the plant as a side-line.

Canada's gold production in 1943 totalled 3,651,301 troy ounces, valued at $140,575,088, as compared with 4,841,306 ounces, valued at $186,390,281, in the previous year, the Dominion Bureau of Statistics reports. The quantity of gold recovered from ores in 1943 is the smallest since 1936. Ontario produced 58 per cent., Quebec 25.3 per cent., British Columbia 6.6 per cent., and the balance by Yukon, North-West Territories and Nova Scotia.

Forthcoming Events

Professor I. M. Heilbron will deliver the Aldred Lecture on "The New Insecticidal Material DDT," at the **Royal Society of Arts,** on **November 22,** at 1.45 p.m.

The inauguration of a Liverpool centre for the North-Western Section of the **Institute of Fuel** will take place on **November 22** at the Municipal Annexe, Dale Street, Liverpool, at 2.30 p.m., when the President and Dr. Grumell will deliver addresses.

The Chemical Society meets in the Chemistry Department, University College, Nottingham, on **November 20,** at 4 p.m., to hear a lecture on "The Usefulness of the Concept of Resonance in Chemistry," by Mr. R. P. Bell, F.R.S.

The third paper in the series on thermal insulation, entitled "The Practical Aspect of Reheating and Heat-Treatment Furnace Insulation" will be read by Mr. A. Stirling, before the Midland Section of the **Institute of Fuel,** at the James Watt Memorial Institute, Birmingham, on **November 22,** at 2.30 p.m.

The Food Group, S.C.I., meets on **November 22,** at 2.15 p.m., at Burlington House, when the following Papers will be presented: "Dried Egg: the Relationship of Analysis to Flavour," by C. M. F. Fryd, B.Sc., A.R.C.S., A.R.I.C.; S. W. F. Hanson, M.Sc., A.R.I.C., and A. F. Weiss, B.Sc., F.R.I.C. "The Baking Quality of Dried Egg," by D. W. Grover, B.Sc., F.R.I.C., and Dr. J. R. Hawthorn. "Day to Day Variations in the Vitamin-C contents of Vegetables," by A. L. Bacharach, M.A., F.R.I.C., and M. E. Coates, Ph.C.

The Iron and Steel Institute is holding its Autumn General Meeting at the Institution of Civil Engineers, Gt. George Street, S.W.1, on **November 23** and **24,** at 11 a.m. and 2.45 p.m., and at 10.30 a.m. and 1.0 p.m. respectively. The meeting will be devoted to a "Discussion on Blast-Furnace Operation and Problems."

Dr. E. F. Armstrong will speak on "The Gas Industry—Yesterday and Tomorrow," at the **Royal Institution of Great Britain,** on **November 24,** at 5 p.m.

Dr. W. Reid will present a paper on "The Mining of Coal" to the Scottish Section of the **Institute of Fuel** at the Royal Technical College, Glasgow, on **November 24,** at 5.45.

A symposium (to which visitors are welcome) entitled "Industrial Physics in Scotland," will be held by the Scottish branch of the **Institute of Physics** at 3 p.m., on **November 25,** at the University of Glasgow (Natural Philosophy Building). Opening speakers will be: Mr. W. Barr and Mr. T. Pearson, on "Physical Control Methods in the Steel Industry"; Dr. A. G. White on "Physics in the Chemical Industry," and Mr. W. G. Marskell, on "Physics in the Mechanical Engineering Industry."

"Silver Plating of Steel" is the subject of a paper to be read by Mr. A. Sprague, M.Sc., A.R.I.C., on **November 27,** at 5 p.m., before the **Electrodepositors' Technical Society** at the Northampton Polytechnic Institute, St. John Street, E.C.1.

The Chemical Society, together with the Glasgow University Alchemists' Club and the Andersonian Society, meet on **November 27,** at 4 p.m., at the Royal Technical College, Glasgow, to hear a lecture on "Some Recent Studies in Diazo-Chemistry," by Dr. H. H. Hodgson.

The London Section of the **Institute of the Plastics Industry,** meets on **November 28,** at 6.30 p.m., at the Waldorf Hotel, Aldwych, London, to hear a paper by Dr. Dunningham on: "Fuel Economy in the Plastics Industry."

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

CORNHOLME DYEING CO., LTD. (M., 18/11/44.) Oct. 21, £25 debenture to Jas. Mitchell, Todmorden; general charge. *£1,280. September 3, 1941.

STEWARTS & LLOYDS, LTD. (M., 18/11/44.) October 23, collateral charge supplemental to a Trust Deed dated January 30 and June 14, 1934, and deeds supplemental thereto; charged on various properties, etc.

Satisfactions

MIDLAND TAR DISTILLERS, LTD., Birmingham. (M.S., 18/11/44.) Satisfaction October 24, of debenture stock registered August 6, 1936, to the extent of £8,500.

BRITISH DIESEL OIL & PETROL CO., LTD. (formerly L. T. C. Distillates, Ltd.), Gawber, near Barnsley. (M.S., 18/11/44.) Satisfaction October 30, of debenture registered April 4, 1938, to the extent of £6,000.

SUTCLIFFE SPEAKMAN & CO., LTD., Leigh (Lancs.), engineers. (M.S., 18/11/44.) Satisfaction October 19. £7,500, registered September 22, 1936.

Receiver Ceasing to Act

AIREDALE CHEMICAL CO., LTD. (dissolved), Bradford. (18/11/44.) A. J. Downs. October 17.

Company News

International Petroleum Co. is paying a semi-annual dividend of 50 cents on Coupon No. 62.

Lawes Chemical Co., Ltd., is repeating the dividend of 6 per cent. for the year ended June 30.

Tube Investments, Ltd., announce a final dividend on the ordinary stock of 12½ per cent, making 22½ per cent. for the year to October 31 (20 per cent.)

The International Nickel Co. of Canada have declared a quarterly dividend of 40 per cent. (same) on the common stock, making $1.60 for the year.

Wade Potteries, Ltd., report a net profit for the year ended July 31, 1944, of £6,624 (£6,363). An ordinary dividend of 5 per cent. (the first since 1936-37) has been declared.

Pacific Salt Co., Ltd., announce that the sale of properties in Mexico has now been completed. Profit for year to November 30 totals £4,483 (£2,867). No dividend since 1933.

Lightalloys, Ltd., report a trading profit to June 30, of £35,150 (£33,075). Net profit stands at £38,270 (£37,718). Final dividend 12½ per cent. (same), making 25 per cent. (same). Forward: £5,000 (£5,230).

Allen and Hanburys, Ltd., report a net profit for the year to June 30, of £54,017 (£46,706). Taxation absorbed £230,000 (£215,600) of the gross profit of £289,154 (£266,860). Final ordinary dividend is 10 per cent., making 15 per cent. (same).

South African Torbanite Mining Co. are offering 891,250 5s. shares at par in the proportion of one for every two held on October 19 last. Proceeds are to finance development at Ermelo mine, which will have the effect of doubling the retorting capacity of the plant.

Chemical and Allied Stocks and Shares

VALUES in most sections of stock markets have again shown an upward movement under the lead of gilt-edged stocks. Leading industrial shares again tend to rise in price now that yields seem more attractive when compared with the trend to lower yields in British Funds. Hopeful views on the post-war outlook for the heavy industries induced better demand for iron and steel shares, which showed further general improvement, although gains in many cases did not exceed more than a few pence. Home rails moved higher, but earlier rises were not fully held. Sentiment in regard to iron and steel shares was aided by the unexpected increase from 20 per cent. to 22½ per cent. in the distribution of Tube Investments, which rose by 3s. 9d. to 100s. 7½d. xd. In view of the association with the last-named company, Stewarts & Lloyds improved to 56s. 9d. There was also buying of Richard Thomas 6s. 8d. ordinary, which strengthened

to 14s., Dorman Long also improving to 27s. 4½d., with Guest Keen higher at 40s. 3d., and Ruston & Hornsby moving up to 50s.

Imperial Chemical have been steady at 39s. 7½d., with Lever & Unilever 46s., Babcock & Wilcox 53s., British Oxygen 89s. 9d., and British Aluminium 47s. British Match moved higher at 41s. 9d. Borax Consolidated deferred strengthened to 37s., while various shares of other companies with interests in the U.S.A. also received more attention. Dunlop Rubber eased to 48s. 3d., and General Refractories at 17s. 10½d. also lost part of an earlier rise, as did Turner & Newall at 83s. 6d., and Wall Paper Manufacturers deferred at 45s. 3d. Imperial Smelting strengthened further to 14s. 9d. on hopes that the forthcoming results may show improved earnings. Cement shares weakened; absence of interim dividends depressed Associated Cement and British Portland to 63s. 6d. and 92s. 6d., respectively. British Plaster Board 5s. ordinary were an active feature, rising further to 41s. 1½d., expectations that the company will remain very busy for a long time to come having led to hopes of a rising trend in dividends. Elsewhere, Metal Box shares moved higher at 93s. 9d. on hopes of expansion in business after the war. Barry & Staines showed firmness at 53s., while Nairn & Greenwich were 76s. 3d. After an earlier reaction on the meeting, where it was indicated that slowing down of war work may affect earnings in the current year, Triplex Glass became firmer at 43s.; as in many other instances, post-war hopes are the main factor influencing current views. Among paint shares, Lewis Berger were firm at 106s., awaiting the forthcoming dividend announcement.

B. Laporte were firm at 83s, W. J. Bush 70s., Fisons ordinary 51s., and Greeff-Chemicals 5s. ordinary 8s., with Monsanto Chemicals 5½ per cent. preference 23s., and British Drug Houses 28s. Textiles showed a number of strong gains and were generally firm, with Bradford Dyers 24s. 6d., Bleachers 12s. 6d., and Calico Printers 16s. 6d. Shares of companies connected with plastics were more active, De La Rue being 197s. 6d., Erinoid 5s. ordinary 11s. 6d., and British Industrial 2s. shares 7s. 3d. Elsewhere, Boots Drug kept firm at 56s. 6d. Sangers were 28s. 9d., and Timothy Whites 41s. In other directions, Gas Light & Coke ordinary were 23s., and Low Temperature Carbonisation 2s. shares transferred up to 2s. 7½d. T. W. Ward shares strengthened to 37s. 6d., following the statements at the meeting. Electrical equipment issues tender to improve, General Electric being 94s. 3d., English Electric 52s. 6d., and Associated Electrical 55s. Oil shares were inclined to ease, Anglo-Iranian being 116s. 10½d., and Ultramar 80s., but Apex rallied to 34s. 1½d.

British Chemical Prices

Market Reports

DELIVERIES of the chief lines of heavy chemical products during the past week have been maintained on steady lines in London, and moderate additions to order books have been reported. With regard to prices the market maintains a firm front. In the soda products section no difficulty is experienced in disposing of supplies of such materials as bichromate and prussiate of soda, offers of which are restricted. Caustic soda is firm and moving steadily into consumption. A steady inquiry is maintained for industrial refined nitrate of soda and supplies are readily absorbed as they become available. There has been a fair demand for the various grades of sulphide of soda and a moderate business is passing in acetate of soda. Both soda ash and bicarbonate of soda are strong markets and are meeting with a steady demand. A brisk movement is reported in hyposulphite of soda while chlorate of soda remains firm with supplies scarce. Among the potash chemicals the B.P. and technical grades of permanganate maintain a strong front and the past week has witnessed a continued steady call for supplies. Bichromate is being steadily absorbed as offers are made and acid phosphate of potash remains in good call. There is no improvement in the supply position of yellow prussiate of potash. In other directions the demand for white powdered arsenic and glycerine keeps fully up to its recent level, and steady deliveries of formaldehyde are being taken up at unchanged rates. Hydrogen peroxide also continues to find a ready outlet. The market for coal-tar products has been rather more active, so far as new business is concerned, though actual additions to order books have been no more than moderate.

MANCHESTER.—From the point of view of deliveries against contracts, reasonably steady trading conditions have been reported during the past week in most sections of the market. A moderate weight of fresh inquiry is circulating, but there does not appear to have been very much in the way of actual additions to order-books. In one or two instances where a tight supply position has been in evidence for some considerable time conditions in this respect show welcome signs of being easier, but there has not so far been much indications of this in the case of the potash materials. Prices remain steady to firm in virtually all sections of the market and are likely to remain so. In the leading tar products, steady movement into consumption has been reported.

GLASGOW.—In the Scottish heavy chemical trade business has improved during the past week in the home market. Export inquiries remain rather limited. Prices keep very firm with no actual changes to report.

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THE INSTITUTION OF CHEMICAL ENGINEERS EXAMINATIONS, 1945

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WANTED back numbers of this journal as follows:—19th July, **1941**. 17th January, **1942**, and Index-Vol. 46 January-June, **1942**. 25th July, 1st August, 7th November **for year 1942** 20th, 27th February, 15th May, 17th, 24th July, 4th September, 2nd October **for year 1943**. Indian Jute Mills Association, Imperial Institute, London, S.W.7.

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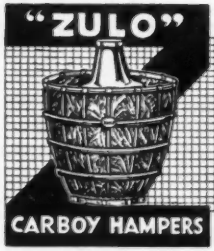

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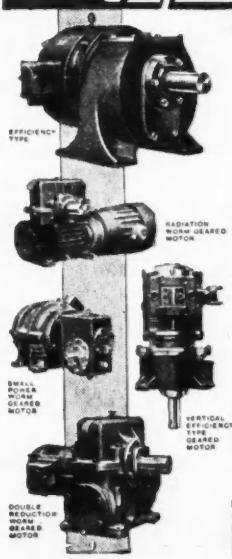
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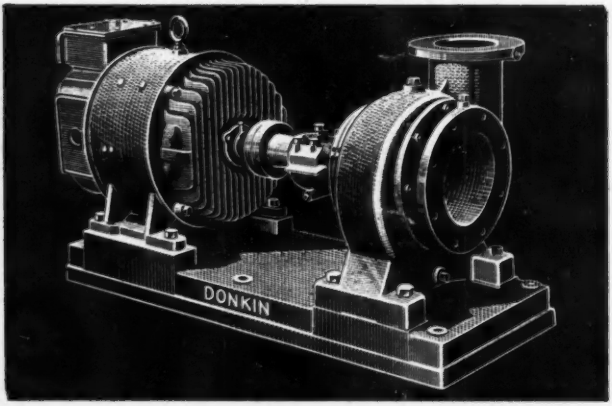

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